

1. A method of packing and unpacking a column chamber, comprising the steps of:

partially closing said outlet port for capturing said matrix material and permitting said fluid to flow therepast by rotating relative one to the other of a rod with a binary end placed in said actuator port and said column chamber; and

further rotating relative one to the other of said rod and said column chamber thereby opening said outlet and permitting said matrix material and said fluid to flow therethrough thereby unpacking the matrix material from the column chamber.

2. The method of claim 1 wherein the unpacking removes substantially all of the matrix material from the column chamber.

3. The method of claim 2 wherein all of the matrix material is removed from the column chamber.

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4. The method of claim 1 wherein a first fluid is flowed into the column chamber during packing and a second fluid is flowed into the column chamber during unpacking, the second fluid being different from the first fluid.

5. A method of forming a packed column, comprising:  
providing a column chamber, the column chamber having an inlet end and an outlet end, the outlet end having an actuator port and a flow port, the flow port alternately open or obstructed by a binary end of a rod placed in the actuator port, the flow port first obstructed with the binary end, and  
flowing a mixture of the first fluid and the matrix material into the column chamber through the inlet end for packing the matrix material within the column chamber.

6. The method of claim 5 further comprising, after packing the matrix material in the column chamber, opening the flow port by a rotation of either of the rod or the column chamber with respect to the other and flowing a second fluid through the column chamber thereby unpacking the matrix material from the column chamber.

7. The method of claim 6 wherein the first fluid and the second fluid are the same.

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8. A method of purifying a component of a sample, comprising:  
providing a column chamber, the column chamber having an inlet end and an outlet end, the outlet end having an actuator port and a flow port, the flow port being partially obstructed with a rod with a binary end;

flowing the first fluid and the matrix material into the column chamber through the inlet end and along the first flow path to form a packed column of the matrix material within the column chamber, the rod holding the matrix material and permitting flow of the first fluid therethrough, the matrix material being configured to selectively retain a component of the sample;

flowing the sample through the packed column for separating the component from the rest of the sample;

unobstructing the flow port; and

flowing a second fluid through the column chamber to remove the matrix material from the column chamber.

9. The method of claim 8 wherein said sample is a chemical sample.

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10. The method of claim 8 wherein the sample is a biological sample.

11. The method as recited in claim 10, wherein said biological sample has the component of a nucleic acid.

12. The method as recited in claim 10, wherein said biological sample has the component of a protein.

13. The method of claim 11 wherein the nucleic acid comprises at least one of DNA or RNA.

14. The method of claim 8 further comprising eluting the component from the packed column before removing the matrix material from the column chamber.

15. The method of claim 8 further comprising eluting the component from the matrix material after removing the matrix material from the column chamber.

16. The method of claim 8 further comprising recirculating at least some portions of the sample through the packed column prior to removing the matrix material from the column chamber.

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17. A method of purifying a biological sample, comprising:

providing a column chamber, the column chamber having an inlet end and an outlet end, the outlet end having a flow port and an actuator port partially obstructed with a rod with a binary end;

flowing a mixture of the first fluid and the matrix material into the column chamber to form a packed column of the matrix material within the column chamber, the matrix material being configured to selectively retain a biological sample;

flowing a sample containing the biological sample through the packed column to separate the biological sample from other components of the sample;

flowing a second fluid through the column chamber to remove the matrix material from the column chamber.

18. A column-based separations system, comprising:

a column chamber having an inlet and an outlet, said outlet in fluid communication with a first flow path alternately obstructed and opened by a rod with a binary end.

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19. The system of claim 18, further comprising a column matrix material retained in said column chamber by said rod.

20. The system of claim 18, further comprising a heater in thermal contact with said column chamber.